

ASSEMBLY OF THE JUPITER II
DSD-125 DUAL SERIAL DATA INTERFACE MODULE

THIS MANUAL PROVIDES ALL INSTRUCTIONS REQUIRED TO ASSEMBLE THE DSD-125 DUAL SERIAL DATA INTERFACE MODULE OF THE WAVE MATE JUPITER II COMPUTER SYSTEM.

THE DUAL SERIAL DATA INTERFACE PROVIDES ALL CIRCUITRY REQUIRED TO INTERFACE TWO ASYNCHRONOUS RS 232 TERMINALS OR MODEMS TO THE JUPITER II SYSTEM BUS. EACH PORTION OF THE INTERFACE OPERATES COMPLETELY INDEPENDENT OF THE OTHER. TWO DIFFERENT TYPES OF TERMINALS OR DEVICES OPERATING AT SEPARATE BAUD RATES MAY BE INTERFACED WITH THIS MODULE.

DSD-125

WAVE MATE

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SECTION 4 HARDWARE ASSEMBLY

4.1 HOW TO USE THIS MANUAL

THE HARDWARE ASSEMBLY INSTRUCTIONS ARE DIVIDED INTO SUBSECTIONS. EACH SUBSECTION CONTAINS AN INTRODUCTION DESCRIBING THE GENERAL PROCEDURES TO BE FOLLOWED, AND THEN A DETAILED STEP-BY-STEP SET OF INSTRUCTIONS FOR EACH COMPONENT TO BE INSTALLED. THE STEP-BY-STEP INSTRUCTIONS PROVIDE A PLACE () FOR A CHECKMARK AFTER EACH STEP IS COMPLETED.

IF MULTIPLE COMPONENTS ARE TO BE INSTALLED REPEATING THE SAME INSTRUCTION, A PLACE IS PROVIDED FOR A CHECKMARK FOR EACH COMPONENT INSTALLATION STEP.

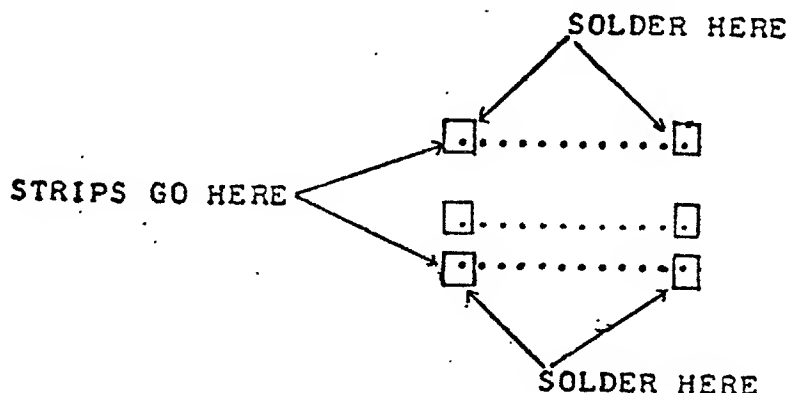
4.2 24- OR 40-PIN SOCKETS

EACH 24- OR 40-PIN SOCKET CONSISTS OF TWO SEPARATE 12- OR 20-PIN STRIPS. THE 24-PIN SOCKETS ARE ALWAYS INSTALLED HORIZONTALLY AT THE EXTREME RIGHT OR LEFT END OF A ROW. THAT IS, THESE SOCKETS ALWAYS OCCUPY COLUMN 1, 2, AND 3 OR 6, 7, AND 8 OF A ROW. A 40-PIN SOCKET IS ALWAYS INSTALLED AT THE EXTREME RIGHT END OF A ROW. THAT IS, THESE SOCKETS ALWAYS OCCUPY COLUMNS 4, 5, 6, 7, AND 8 OF A ROW. A WHITE DOT ON THE COMPONENT SIDE OF THE BOARD DENOTES PIN 1 OF A SOCKET. THE DIMPLE NEAR THE END OF THE SOCKET SHOULD ALWAYS BE POINTED TOWARD THE LEFT SIDE OF THE BOARD. WHEN THE TERMINALS ARE CORRECTLY ALIGNED WITH THE HOLES IN THE PRINTED CIRCUIT BOARD, GENTLY PUSH THE TERMINALS THROUGH THE HOLES UNTIL THE STRIP IS FLUSH AGAINST THE TOP OF THE BOARD.

HOLDING THE STRIPS, TURN THE BOARD OVER AND LAY IT DOWN ON THE WORK TABLE.

REFER TO SECTION 4.11 TO DETERMINE IF A GROUND CLIP IS TO BE INSTALLED ON A LEAD TO BE SOLDERED TO THE BOARD. IF SO, REFER TO THE INSTRUCTIONS IN 4.11 AND INSTALL THE GROUND CLIP TO THE PIN. THEN SOLDER THE GROUND CLIP TO THE GROUND PLANE AND THE PIN TO THE SOLDER PAD.

SOLDER THE PINS AT THE ENDS OF EACH STRIP TO THE SOLDER PAD AS SHOWN. DO NOT CUT THESE LEADS.



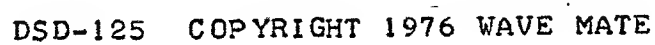
AFTER SOLDERING, CHECK FOR SOLDER BRIDGES AND FOR SOLDER ON THE TERMINALS OF THE STRIPS. SCRAPE OFF ANY SOLDER ON THESE STRIPS WITH A SCREWDRIVER OR AN EXACTO KNIFE.

24-PIN SOCKETS

- () INSTALL AND SOLDER TWO 12-PIN STRIPS AT (A6, 7, 8)
- () INSTALL AND SOLDER TWO 12-PIN STRIPS AT (B6, 7, 8)

CHECK ALL SOCKETS TO MAKE SURE THAT ALL STRIPS ARE DOWN FLUSH ON THE BOARD. IF ANY ARE NOT, REHEAT THE SOLDER PAD ON ONE, AND PRESS THE BOARD DOWN OVER THE SOCKET STRIP. DO THIS FOR ALL SOCKET STRIPS THAT ARE NOT FLAT ON THE BOARD.

- () CHECK FOR SOLDER BRIDGES.
- () CHECK FOR SOLDER ON TERMINALS.



4.3 INPUT VOLTAGE FILTER CAPACITORS

INSTALL 1UF 35V TANTALUM CAPACITORS (COLOR CODE BROWN, BLACK, GREEN) IN THE LOCATIONS MARKED "C1" NEAR THE BOTTOM OF THE BOARD. REFER TO THE ASSEMBLY DRAWING TO DETERMINE WHICH OF THE 4 C1 LOCATIONS ARE TO BE FILLED.

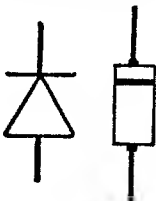
THE BLUE STRIPE ON THE CAPACITOR MUST LINE UP WITH THE + MARKED ON THE BOARD.

AFTER INSTALLING EACH CAPACITOR BEND THE LEADS TO RETAIN THE CAPACITORS.

- () () () INSTALL 1UF CAPACITOR
- () CHECK POLARITY
- () SOLDER ALL CAPACITORS
- () CLIP LEADS
- () CHECK FOR SOLDER BRIDGES AND COLD SOLDER JOINTS

4.4 REVERSE VOLTAGE PROTECTION

INSTALL 1N4001 1 AMP DIODES IN LOCATIONS MARKED D1. THE BANDED END OF THE DIODE MUST LINE UP WITH THE BAR ON THE DIODE SYMBOL ON THE BOARD:



BEND BOTH LEADS DOWNWARD CLOSE TO THE DIODE BODY, TO MATCH THE SPACING IN THE BOARD. INSERT THE DIODE LEADS THROUGH THE HOLES MARKED "D1" AND BEND THE LEADS OUT TO RETAIN THE DIODES.

- () () () INSTALL DIODE, ROW B
- () SOLDER ALL DIODE LEADS
- () CLIP LEADS
- () CHECK FOR SOLDER BRIDGES AND COLD SOLDER JOINTS

4.5 LOW FREQUENCY BYPASS CAPACITORS

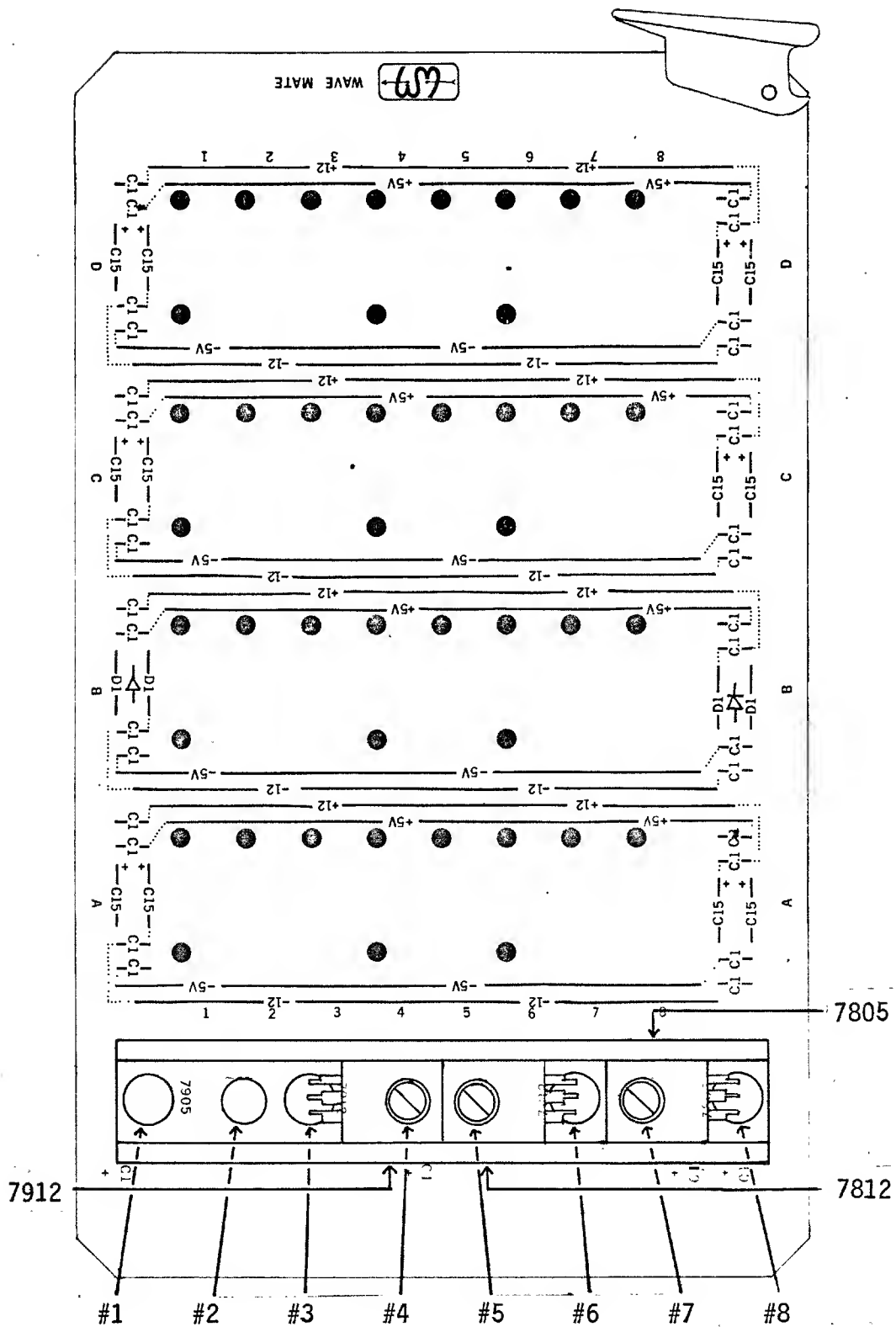
INSTALL 15UF 15V TANTALUM LOW FREQUENCY BYPASS CAPACITOR IN LOCATIONS MARKED C15. THE POSITIVE END OF THE CAPACITOR IS INDICATED BY THE SLOPING EDGES AS WELL AS A WHITE + MARK. THE POSITIVE END OF THE CAPACITOR MUST LINE UP WITH THE WHITE + PRINTED ON THE BOARD.

BEND BOTH LEADS DOWNWARD CLOSE TO THE CAPACITOR BODY, INSERT THE LEADS THROUGH HOLES MARKED "C15" AND BEND THE LEADS TO RETAIN THE CAPACITORS.

- () INSTALL 15UF CAPACITOR, ROW A
- () INSTALL 15UF CAPACITOR, ROW C
- () () () INSTALL 15UF CAPACITOR, ROW D
- () CHECK POLARITY
- () SOLDER ALL CAPACITORS
- () CLIP LEADS
- () CHECK FOR SOLDER BRIDGES AND COLD SOLDER JOINTS

4.6 VOLTAGE REGULATORS

- () PLACE THE HEAT SINK ON THE BOARD ABOVE THE BUS CONNECTOR SO THAT THE NUMBERS 7805, 7812, 7912, 7905 ARE COVERED UP, AND THE SMALL HOLES IN THE HEAT SINK LINE UP WITH THE LARGE HOLES ON THE BOARD.
- () PLACE A 1/8" NYLON SPACER IN HOLE #7
- () PLACE A 1/8" NYLON SPACER IN HOLE #5
- () PLACE A 1/8" NYLON SPACER IN HOLE #4
- () () () PLACE ONE PLASTIC INSULATOR ON EACH REGULATOR SUPPLIED. THESE INSULATORS ARE COATED ON BOTH SIDES WITH A SPECIAL HEAT TRANSFER COMPOUND. LINE UP THE HOLE ON THE PLASTIC WITH THE HOLE IN THE REGULATOR.
- () PLACE THE 7805 REGULATOR LEADS THROUGH HOLE #8 AND THE THREE HOLES IN THE CIRCUIT BOARD. THE HOLE IN THE REGULATOR SHOULD LINE UP WITH HOLE #7.
- () PLACE THE 7812 REGULATOR LEADS THROUGH HOLE #6 AND THE THREE HOLES IN THE CIRCUIT BOARD. THE HOLE IN THE REGULATOR SHOULD LINE UP WITH HOLE #5.
- () PLACE THE 7912 REGULATOR LEADS THROUGH HOLE #3 AND THE THREE HOLES IN THE CIRCUIT BOARD. THE HOLE IN THE REGULATOR SHOULD LINE UP WITH HOLE #4.
- () () () PLACE A #6 LOCKWASHER ON A #6-32 X 1/2 ROUND HEAD SCREW AND PUSH THROUGH EACH REGULATOR FROM HEAT SINK SIDE OF BOARD.
- () () () PLACE A #6 FLAT WASHER ON A #6-32 X 1/2 ROUND HEAD SCREW AND PUSH THROUGH HOLE #2 FROM HEAT SINK SIDE OF BOARD.
- () () () PICK BOARD UP ON EDGE AND PLACE A #6 LOCK WASHER AND A #6-32 HEX NUT ON EACH SCREW.
- () () () TIGHTEN ALL HARDWARE FROM THE NUT SIDE WITH A SOCKET WRENCH. DO NOT OVER TIGHTEN.
- () () () SOLDER THE TWO OUTSIDE LEADS OF EACH REGULATOR.
- () () () CLIP ALL THREE LEADS OF EACH REGULATOR.
- () CHECK FOR SOLDER BRIDGES.
- () CHECK FOR COLD SOLDER JOINTS.



4.7 BUS AND I/O CONNECTORS

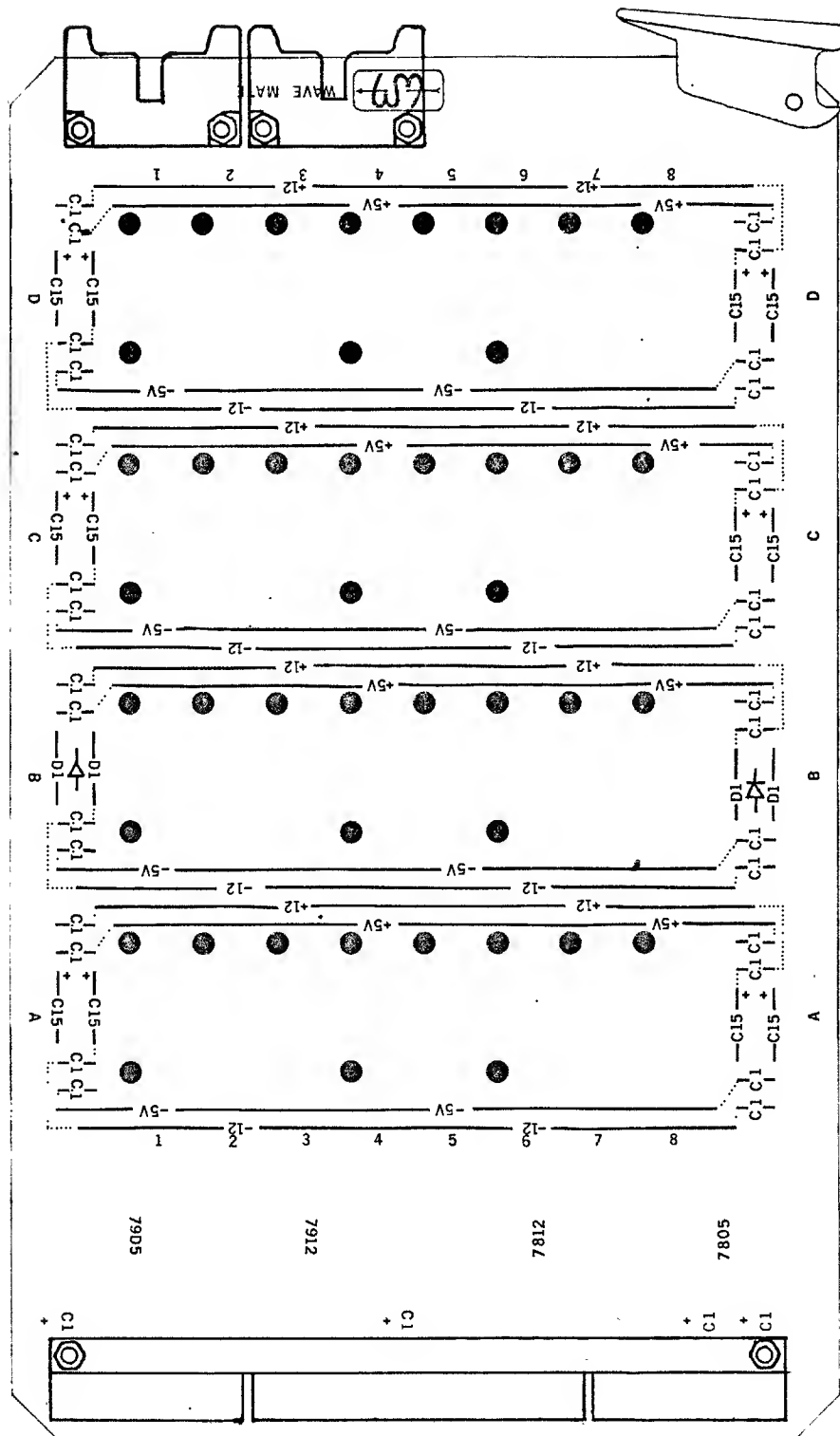
- () ORIENT THE BUS CONNECTOR AT THE BOTTOM OF THE BOARD SO THAT THE LONG LEADS POINT TO THE BOARD AND THE SHORT LEADS ARE FACING TOWARDS THE BOTTOM OF THE BOARD.
 - () WORK THE LONG LEADS THROUGH THE CORRESPONDING HOLES BEING CAREFUL NOT TO CRUNCH THE FILTER CAPACITORS IN THE BOARD. PUSH THE CONNECTOR DOWN UNTIL IT IS FLAT AGAINST THE BOARD.
 - () INSTALL A 2-56 X 1/2 SCREW AND NUT AT EACH END OF THE CONNECTOR. THE SCREW HEAD IS ON BOTTOM OF BOARD AND THE NUT IS ON TOP OF CONNECTOR.
 - () IN THE SAME MANNER INSTALL A 10-PIN I/O CONNECTOR IN THE TOP LEFT HAND CORNER OF THE BOARD. THE HOLES IN THE CONNECTOR SHOULD LINE UP WITH THE LARGER HOLES IN THE BOARD.
 - () INSTALL THE SECOND 10-PIN CONNECTOR TO THE RIGHT OF THE ONE PREVIOUSLY INSTALLED. THE HOLES SHOULD LINE UP WITH THE LARGER HOLES IN THE BOARD.
 - () INSTALL A 2-56 X 1/2 SCREW AND NUT AT EACH END OF THE CONNECTORS.
- THE 4 CONNECTOR LEADS ON THE RIGHT-HAND SIDE AND THE 10 ON THE LEFT-HAND SIDE ARE TO BE SOLDERED.
- () USING WIRE CUTTERS, CLIP ONLY THOSE LEADS SHOWN IN FIGURE 4.7.1 AS CLOSE TO THE BOARD AS POSSIBLE.



FIGURE 4.7.1

- () SOLDER THE 4 LEADS ON THE RIGHT-HAND SIDE COMMON PAD FORMING A SMOOTH SOLDER LAKE.
- () SOLDER THE PINS ON THE LEFT-HAND SIDE TO THE PADS BEING CAREFUL NOT TO FORM BRIDGES. IT IS IMPORTANT THAT GOOD SOLDER CONNECTIONS ARE MADE, AS THESE PINS SUPPLY POWER TO THE CARD. A POOR SOLDER CONNECTION WILL CAUSE INTERMITTANT OPERATION.
- () CHECK THE ADJACENT (UNCLIPPED) CONNECTOR LEADS FOR SOLDER. SCRAPE ANY SOLDER OFF THESE LEADS.
- () CHECK LEFT-HAND SIDE FOR SOLDER BRIDGES
- () CHECK FOR COLD SOLDER JOINTS

10-PIN CONNECTOR



BUS CONNECTOR

4.8 BUSS BARS

EACH BUSS BAR CONTAINS 10 TERMINALS. THE TWO END TERMINALS ARE SOLDERED TO THE PRINTED CIRCUIT CARD. THE REMAINING 8 TERMINALS ARE USED TO SUPPLY POWER TO EACH OF THE SOCKETS THAT MAY BE INSTALLED IN THE ROW.

EACH BUSS BAR LOCATION IS INDICATED BY A WHITE LINE ON THE BOARD WITH THE VOLTAGE INDICATED (+12, +5, -5, -12). WHEN INSTALLED, THE BUSS BAR SHOULD COMPLETELY COVER THE APPROPRIATE WHITE LINE.

THE +5 AND +12 VOLT BUSS BARS ARE LOCATED ABOVE EACH ROW, WHILE THE -5 AND -12 VOLT BUSS BARS ARE LOCATED BELOW EACH ROW.

VISUALLY CHECK THE BUSS BAR PINS TO CONFIRM THAT THEY ARE STRAIGHT. CHECK BY SIGHTING FROM THE END AS WELL AS FROM THE FRONT.

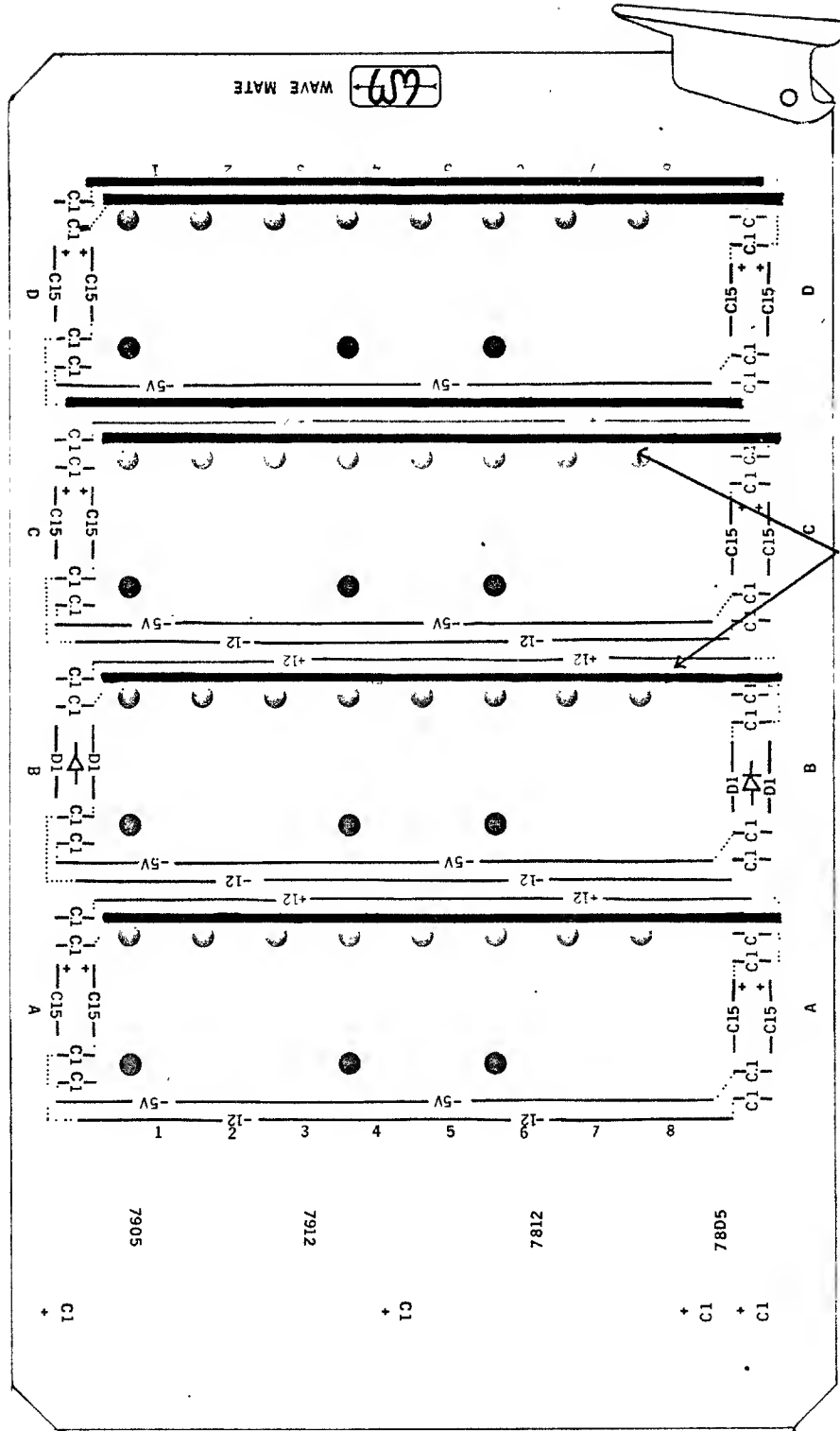
LINE UP THE PINS WITH THE HOLES IN THE BOARD AND WIGGLE IN UNTIL THE BOTTOM OF THE BUSS BAR IS FLUSH AGAINST THE BOARD.

BEND THE 2 END PINS OVER SLIGHTLY TO HOLD THE BARS IN THE BOARD.

- () INSTALL BUSS BAR +12V, ROW D
- () INSTALL BUSS BAR +5V, ROW D
- () INSTALL BUSS BAR -12V, ROW D

- () INSTALL BUSS BAR +5V, ROW C
- () INSTALL BUSS BAR +5V, ROW B
- () INSTALL BUSS BAR +5V, ROW A

- () RECHECK POSITIONS
- () SOLDER ALL BUSS BAR END PINS
- () CLIP ALL BUSS BAR END PINS
- () CHECK FOR SOLDER BRIDGES
- () CHECK ALL PINS FOR STRAIGHTNESS



(6) BUSS BAR

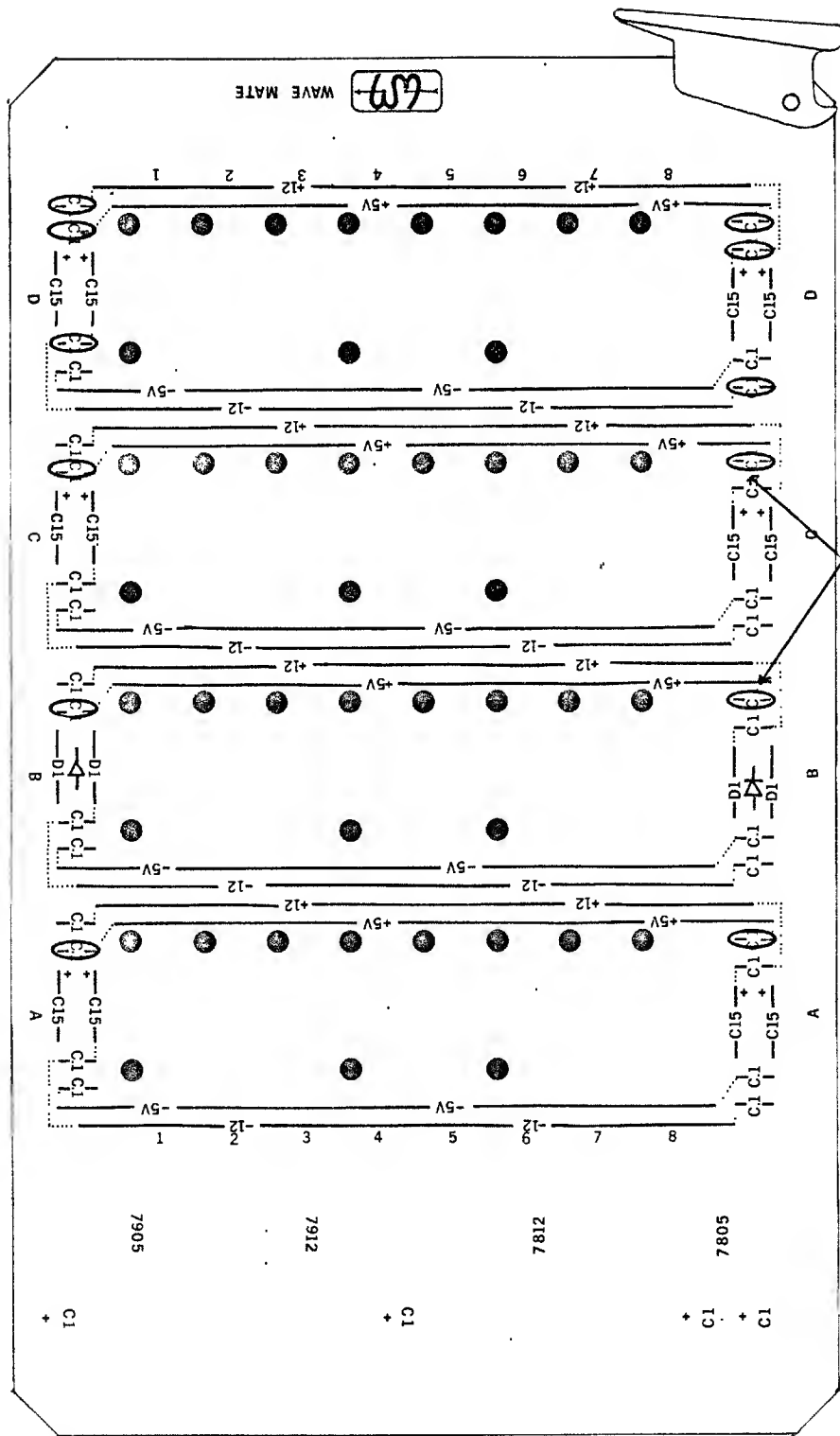
4.9 HIGH-FREQUENCY BYPASS CAPACITORS

A HIGH-FREQUENCY BYPASS CAPACITOR IS INSTALLED AT BOTH ENDS OF EACH BUSS BAR. A DOTTED WHITE LINE ON THE PRINTED CIRCUIT BOARD POINTS FROM EACH BUSS BAR TO THE LOCATION OF THE CORRESPONDING BYPASS CAPACITOR.

BLUE 0.1 UF 50V CERAMIC CAPACITORS MARKED "104M" ARE USED FOR THE HIGH FREQUENCY BYPASS.

INSERT THE LEADS THROUGH HOLES MARKED "C.1". BEND THE LEADS TO HOLD THE CAPACITORS IN THE BOARD.

R	L	
()	()	INSTALL 0.1UF CAPACITOR +12V, ROW D
()	()	INSTALL 0.1UF CAPACITOR +5V, ROW D
()	()	INSTALL 0.1UF CAPACITOR -12V, ROW D
()	()	INSTALL 0.1UF CAPACITOR +5V, ROW C
()	()	INSTALL 0.1UF CAPACITOR +5V, ROW B
()	()	INSTALL 0.1UF CAPACITOR +5V, ROW A
()		CHECK LOCATIONS
()		SOLDER ALL CAPACITORS
()		CLIP ALL CAPACITOR LEADS
()		CHECK FOR SOLDER BRIDGES
()		CHECK FOR COLD SOLDER JOINTS



4.10 18-PIN IC SOCKETS

SOCKETS FOR 18-PIN IC'S ARE INSTALLED IN THE LOCATIONS SPECIFIED BELOW.

PLACE THE CIRCUIT BOARD ON A TABLE, TOP UP, WITH THE BUS CONNECTOR TOWARD YOU.

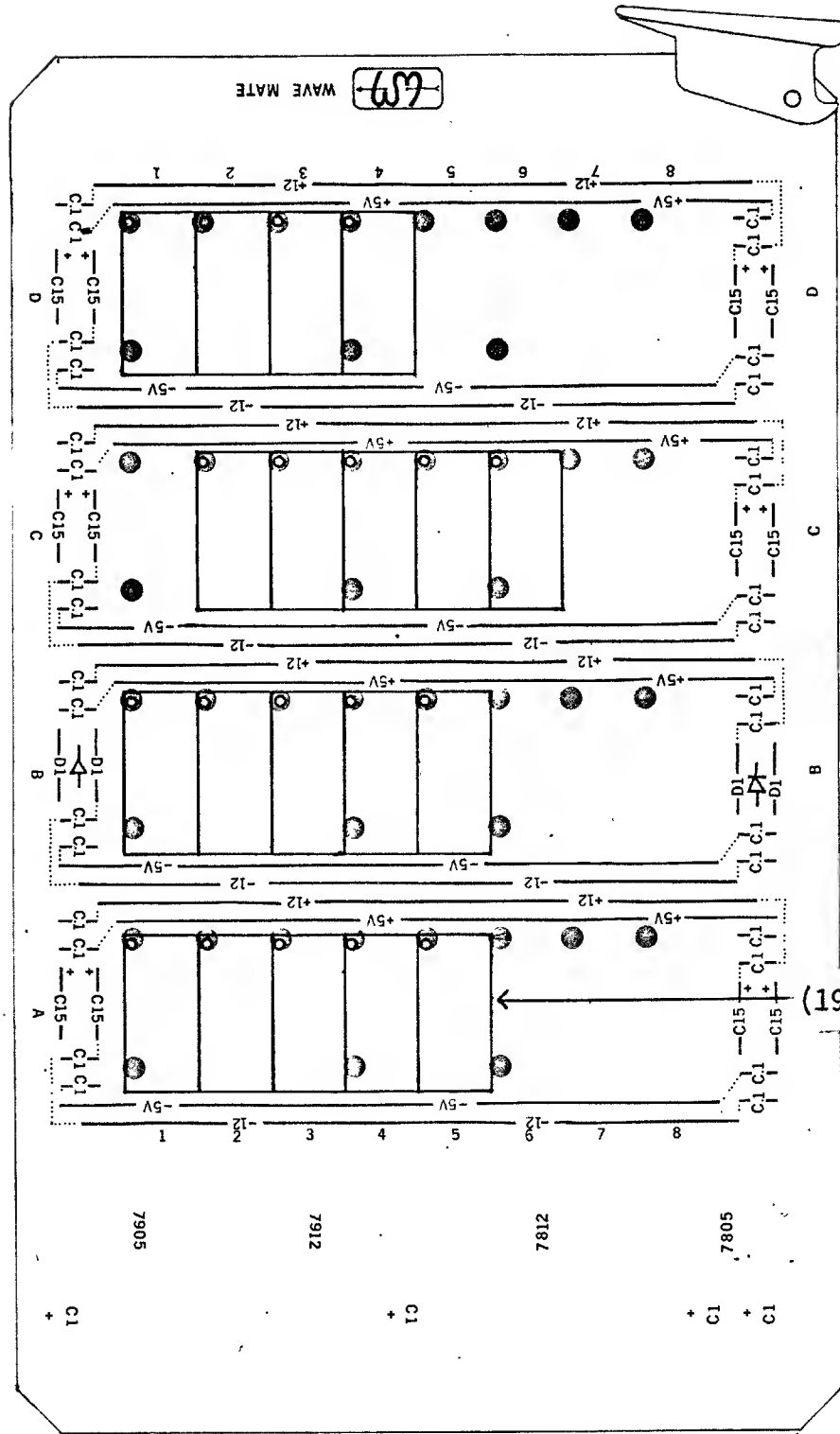
EACH ROW CONTAINS 8 POSITIONS FOR 18-PIN SOCKETS. WHEN INSTALLING THE SOCKET, ORIENT IT SUCH THAT THE SAE MARKING (OR DIMPLE) IS POINTED TOWARD THE TOP OF THE BOARD. BE SURE THAT THE CENTER OF THE SOCKET IS LINED UP WITH THE IDENTIFICATION NUMBER OF THE COLUMN (1-8). PIN 1 OF THE SOCKET (UPPER LEFT-HAND CORNER) SHOULD BE LINED UP WITH THE WHITE DOT ON THE BOARD.

LINE UP THE SOCKET TERMINALS WITH THE CORRESPONDING HOLES IN THE PRINTED CIRCUIT BOARD AND GENTLY PUSH THE TERMINALS THROUGH THE HOLES. THEN SNAP THE SOCKET INTO THE CIRCUIT BOARD.

USING THE CLOSED TIP OF THE NEEDLENOSED PLIERS, PUSH THE PIN IN THE CENTER OF THE SOCKET DOWN UNTIL IT IS FLUSH WITH THE PLASTIC. THE SOCKET WILL BE LOCKED INTO PLACE.

()D1	()D2	()D3	()D4				
	()C2	()C3	()C4	()C5	()C6		
()B1	()B2	()B3	()B4	()B5			
()A1	()A2	()A3	()A4	()A5			

IF IT IS NECESSARY TO REMOVE THE SOCKET, USE A SMALL SCREWDRIVER BLADE TO PUSH THE PIN BACK UP FROM THE BOTTOM. INSERT THE BLADE BETWEEN THE PLASTIC AND PUSH THE PIN UP. USE NEEDLENOSED PLIERS FROM THE TOP TO PULL THE PIN UP. THEN CAREFULLY PUSH THE SOCKET FROM THE BOTTOM OF THE BOARD UNTIL THE SOCKET SNAPS OUT OF THE BOARD.



4.11 GROUND PINS

INSTALL GROUND PINS ON THE DESIGNATED TERMINALS USING THE TOOL PROVIDED. PLACE THE GROUND PIN IN THE INSERTION TOOL. PLACE THE INSERTION TOOL OVER THE TERMINAL WITH THE LEG OF THE GROUND PIN POINTED TOWARD THE INSIDE OF THE SOCKET. PUSH THE INSERTION TOOL DOWN ON THE TERMINAL UNTIL THE LEG OF THE GROUND PIN IS FLUSH AGAINST THE SOLDER PLANE. BE CAREFUL NOT TO BEND THE ELBOW OF THE GROUND PIN.

SOLDER THE GROUND PIN TO THE GROUND PLANE BUT AVOID GETTING SOLDER ON ANY WIRE WRAP PINS. USE AN ADEQUATE AMOUNT OF SOLDER AND MOVE THE TIP OF THE SOLDERING IRON AROUND ON THE GROUND PLANE TO INSURE A SMOOTH SOLDER JOINT.

INSTALL GROUND PINS IN THE FOLLOWING LOCATIONS:

- | | | | |
|------------|------------------------------|----------|----------|
| () D1-7 | () D2-7 | () D3-7 | () D4-7 |
| () C5-8 | () C2-8 | () C3-7 | () C4-7 |
| | () C6-8 | | |
| | () B2-7 | () B3-7 | |
| | () B6-1 | | |
| | () A2-7 | () A3-7 | |
| | () A6-1 | | |
| () CON1-7 | () CON2-7 | | |
| () | SOLDER ALL GROUND PINS | | |
| () | CHECK FOR COLD SOLDER JOINTS | | |

LEVEL ONE WIRES:

PURPLE 7.5 INCH WIRES:

- () 1 A6-5 [7.5] D1-13
- () 2 A6-6 [7.5] D1-16

ORANGE 7.0 INCH WIRES:

- () 3 A6-2 [7.0] D3-12
- () 4 D3-3 [7.0] A6-23

BROWN 6.5 INCH WIRES:

- () 5 D3-6 [6.5] A6-24
- () 6 B6-6 [6.5] D2-16

WHITE 6.0 INCH WIRES:

- () 7 BUS-26 [6.0] A6-13
- () 8 A2-3 [6.0] BUS-60
- () 9 B6-5 [6.0] D2-13

BLUE 5.5 INCH WIRES:

- () 10 C4-13 [5.5] A6-3
- () 11 B6-14 [5.5] A2-1
- () 12 B6-2 [5.5] D4-12
- () 13 D4-3 [5.5] B6-23

GREEN 5.0 INCH WIRES:

- () 14 BUS-35 [5.0] A6-11
- () 15 BUS-59 [5.0] A6-14
- () 16 BUS-58 [5.0] A6-15
- () 17 BUS-57 [5.0] A6-16
- () 18 BUS-56 [5.0] A6-17
- () 19 BUS-55 [5.0] A6-18
- () 20 BUS-54 [5.0] A6-19
- () 21 BUS-53 [5.0] A6-20
- () 22 BUS-52 [5.0] A6-21
- () 23 BUS-51 [5.0] A6-22
- () 24 C6-13 [5.0] B2-3
- () 25 C6-14 [5.0] B2-6
- () 26 C6-15 [5.0] B2-12
- () 27 C6-16 [5.0] B2-15
- () 28 D3-2 [5.0] C5-13
- () 29 BUS-24 [5.0] A3-16
- () 30 D4-6 [5.0] B6-24
- () 31 BUS-36 [5.0] A4-4
- () 32 BUS-11 [5.0] A4-7
- () 33 BUS-13 [5.0] A4-12
- () 34 BUS-38 [5.0] A4-15
- () 35 BUS-29 [5.0] A4-16
- () 36 BUS-37 [5.0] A4-18
- () 37 BUS-39 [5.0] A5-1
- () 38 BUS-31 [5.0] A5-3
- () 39 BUS-40 [5.0] A5-4
- () 40 BUS-15 [5.0] A5-7

- () 41 BUS-17 [5.0] A5-12
- () 42 BUS-42 [5.0] A5-15
- () 43 BUS-33 [5.0] A5-16
- () 44 BUS-41 [5.0] A5-18

YELLOW 4.5 INCH WIRES:

- () 45 A6-9 [4.5] A3-12
- () 46 C6-11 [4.5] C3-2
- () 47 D3-5 [4.5] C5-12
- () 48 D3-13 [4.5] C5-11
- () 49 D3-14 [4.5] CON1-2
- () 50 B2-1 [4.5] A1-14
- () 51 B2-13 [4.5] A1-5
- () 52 B2-16 [4.5] A1-2
- () 53 C4-5 [4.5] B6-3
- () 54 D4-2 [4.5] C5-18
- () 55 BUS-28 [4.5] A4-6
- () 56 BUS-12 [4.5] A4-9
- () 57 BUS-14 [4.5] A4-10
- () 58 BUS-30 [4.5] A4-13
- () 59 BUS-32 [4.5] A5-6
- () 60 BUS-16 [4.5] A5-9
- () 61 BUS-34 [4.5] A5-13

RED 4.0 INCH WIRES:

- () 62 A6-25 [4.0] A6-8
- () 63 C6-1 [4.0] C3-16
- () 64 C6-6 [4.0] C2-12
- () 65 C6-7 [4.0] C2-11
- () 66 C6-12 [4.0] C4-16
- () 67 D1-22 [4.0] D1-1
- () 68 D1-6 [4.0] CON1-6
- () 69 D1-12 [4.0] CON1-5
- () 70 D3-4 [4.0] CON1-4
- () 71 A3-4 [4.0] A5-2
- () 72 A3-5 [4.0] A5-5
- () 73 A3-6 [4.0] A5-17
- () 74 A3-15 [4.0] A5-14
- () 75 A2-4 [4.0] B3-12
- () 76 B2-4 [4.0] A1-17
- () 77 B6-25 [4.0] B6-8
- () 78 D2-22 [4.0] D2-1
- () 79 D2-3 [4.0] CON 2 -9
- () 80 D2-6 [4.0] CON 2 -6
- () 81 D2-12 [4.0] CON 2 -5
- () 82 D4-4 [4.0] CON 2 -4
- () 83 D4-5 [4.0] C5-17
- () 84 D4-13 [4.0] C5-16
- () 85 D4-14 [4.0] CON 2 -2
- () 86 B3-4 [4.0] B5-2
- () 87 B3-5 [4.0] B5-5
- () 88 B3-6 [4.0] B5-17
- () 89 B3-15 [4.0] B5-14

BLACK 3.5 INCH WIRES:

- () 90 A6-7 [3.5] A5-11
- () 91 A5-8 [3.5] A4-11

() 92 A6-10 [3.5] A6-12
 () 93 C3-14 [3.5] C3-13
 () 94 B1-18 [3.5] B1-15
 () 95 B1-4 [3.5] B1-1
 () 96 C6-8 [3.5] C6-5
 () 97 C2-5 [3.5] C2-2
 () 98 C2-14 [3.5] C2-17
 () 99 C6-19 [3.5] C6-18
 () 100 D1-7 [3.5] D1-5
 () 101 D1-4 [3.5] D1-2
 () 102 D1-3 [3.5] CON1-9
 () 103 D1-15 [3.5] CON1-3
 () 104 D1-20 [3.5] D1-18
 () 105 D3-1 [3.5] CON1-8
 () 106 D3-19 [3.5] D3-18
 () 107 A3-1 [3.5] A4-5
 () 108 A3-2 [3.5] A4-17
 () 109 A3-3 [3.5] A4-14
 () 110 A3-19 [3.5] A3-18
 () 111 A2-6 [3.5] A2-2
 () 112 A2-19 [3.5] A2-18
 () 113 B2-2 [3.5] B1-14
 () 114 B2-5 [3.5] B1-17
 () 115 B2-14 [3.5] B1-5
 () 116 B2-17 [3.5] B1-2
 () 117 B2-19 [3.5] B2-18
 () 118 C4-19 [3.5] C4-18
 () 119 C4-17 [3.5] C4-14
 () 120 C4-4 [3.5] C4-1
 () 121 C4-3 [3.5] C3-15
 () 122 C4-15 [3.5] C3-6
 () 123 C3-5 [3.5] C3-3
 () 124 C3-4 [3.5] C3-12
 () 125 A1-18 [3.5] A1-15
 () 126 A1-4 [3.5] A1-1
 () 127 C3-19 [3.5] C3-18
 () 128 B6-7 [3.5] B5-11
 () 129 B5-8 [3.5] B4-11
 () 130 B6-10 [3.5] B6-12
 () 131 D2-7 [3.5] D2-5
 () 132 D2-4 [3.5] D2-2
 () 133 D2-15 [3.5] CON2 -3
 () 134 D2-20 [3.5] D2-18
 () 135 D4-1 [3.5] CON2 -8
 () 136 D4-19 [3.5] D4-18
 () 137 B3-1 [3.5] B4-5
 () 138 B3-2 [3.5] B4-17
 () 139 B3-3 [3.5] B4-14
 () 140 B3-19 [3.5] B3-18
 () 141 C2-8 [3.5] C2-3
 () 142 C2-19 [3.5] C2-18
 () 143 C5-8 [3.5] C5-7
 () 144 C5-6 [3.5] C5-3
 () 145 C5-2 [3.5] C5-1
 () 146 A1-19 [3.5] A1-16
 () 147 A1-13 [3.5] A1-6
 () 148 A1-8 [3.5] A1-11
 () 149 B1-19 [3.5] B1-16
 () 150 B1-13 [3.5] B1-6
 () 151 B1-8 [3.5] B1-11

() 152 BUS-9 [3.5] BUS-10
 () 153 BUS-19 [3.5] BUS-20

LEVEL TWO WIRES:

BLUE 5.5 INCH WIRES:

() 154 A2-2 [5.5] C2-1

GREEN 5.0 INCH WIRES:

() 155 A6-23 [5.0] A1-7
 () 156 C3-12 [5.0] A1-18
 () 157 B6-23 [5.0] B1-7

YELLOW 4.5 INCH WIRES:

() 158 A6-24 [4.5] A1-12
 () 159 B3-12 [4.5] B6-9
 () 160 B6-24 [4.5] B1-12

RED 4.0 INCH WIRES:

() 161 A6-11 [4.0] B6-11
 () 162 A6-13 [4.0] B6-13
 () 163 A6-14 [4.0] B6-14
 () 164 A6-15 [4.0] B6-15
 () 165 A6-16 [4.0] B6-16
 () 166 A6-17 [4.0] B6-17
 () 167 A6-18 [4.0] B6-18
 () 168 A6-19 [4.0] B6-19
 () 169 A6-20 [4.0] B6-20
 () 170 A6-21 [4.0] B6-21
 () 171 A6-22 [4.0] B6-22
 () 172 C3-13 [4.0] B1-18
 () 173 A3-16 [4.0] B3-16
 () 174 A4-4 [4.0] B4-4
 () 175 A4-6 [4.0] B4-6
 () 176 A4-7 [4.0] B4-7
 () 177 A4-9 [4.0] B4-9
 () 178 A4-10 [4.0] B4-10
 () 179 A4-12 [4.0] B4-12
 () 180 A4-13 [4.0] B4-13
 () 181 A4-15 [4.0] B4-15
 () 182 A4-16 [4.0] B4-16
 () 183 A4-18 [4.0] B4-18
 () 184 A5-1 [4.0] B5-1
 () 185 A5-3 [4.0] B5-3
 () 186 A5-4 [4.0] B5-4
 () 187 A5-6 [4.0] B5-6
 () 188 A5-7 [4.0] B5-7
 () 189 A5-9 [4.0] B5-9
 () 190 A5-12 [4.0] B5-12
 () 191 A5-13 [4.0] B5-13
 () 192 A5-15 [4.0] B5-15
 () 193 A5-16 [4.0] B5-16
 () 194 A5-18 [4.0] B5-18

() 195 A3-12 [3.5] A2-5
() 196 C2-17 [3.5] C2-7
() 197 A6-3 [3.5] A6-4
() 198 D1-13 [3.5] D1-14
() 199 D1-16 [3.5] D1-17
() 200 A5-11 [3.5] A5-8
() 201 A4-11 [3.5] A4-8
() 202 A6-8 [3.5] A6-10
() 203 C3-16 [3.5] C3-14
() 204 B1-15 [3.5] B1-4
() 205 C2-12 [3.5] C2-5
() 206 C2-2 [3.5] C2-16
() 207 C2-11 [3.5] C2-14
() 208 C3-2 [3.5] C3-1
() 209 C4-16 [3.5] C4-2
() 210 D1-5 [3.5] D1-4
() 211 C4-18 [3.5] C4-17
() 212 C4-14 [3.5] C4-4
() 213 B6-3 [3.5] B6-4
() 214 C3-3 [3.5] C3-17
() 215 A1-15 [3.5] A1-4
() 216 D2-13 [3.5] D2-14
() 217 D2-16 [3.5] D2-17
() 218 B5-11 [3.5] B5-8
() 219 B4-11 [3.5] B4-8
() 220 B6-8 [3.5] B6-10
() 221 D2-5 [3.5] D2-4
() 222 C5-7 [3.5] C5-6
() 223 C5-3 [3.5] C5-2
() 224 A1-16 [3.5] A1-13
() 225 A1-6 [3.5] A1-3
() 226 B1-16 [3.5] B1-13
() 227 B1-6 [3.5] B1-3

5.3 CHAIN LIST

AFTER YOU HAVE FINISHED WIRING THE BOARD IT IS LIKELY THAT YOU WILL HAVE SOME MISTAKES IN THE WIRING. THESE MUST BE FOUND BEFORE INSERTING IC'S INTO THE SOCKETS. A SIMPLE PROCEDURE CAN BE FOLLOWED TO CHECK THE CORRECTNESS OF THE CONNECTIONS. FOR THIS PURPOSE WE HAVE PROVIDED A CHAIN LIST, WHICH TELLS WHICH POINTS ARE CONNECTED TOGETHER. FOR THIS TEST SOME KIND OF CONTINUITY CHECKER IS REQUIRED: FOR EXAMPLE, AN OHMMETER, A BATTERY WITH A LIGHT BULB, A LOGIC PROBE, OR A TONE GENERATOR. IN ANY CASE, THE TESTER SHOULD USE A LOW DC VOLTAGE (NO MORE THAN 5V) TO CHECK FOR CONTINUITY.

PUT THE BOARD ON A TABLE WITH THE SOCKETS FACING UP AND THE BUS CONNECTOR TOWARDS YOU. REMEMBER: PIN 1 IS LOCATED AT THE DIMPLE ON 18-PIN SOCKETS; FOR 24- AND 40-PIN SOCKETS, PIN 1 IS AT THE DIMPLE ON THE LOWER STRIP. WHEN A POWER CONNECTION IS REFERENCED (I.E., A PIN WITH A NUMBER HIGHER THAN IS ON THE SOCKET), THE CONNECTION SHOULD BE TESTED BY TOUCHING THE APPROPRIATE POWER BUSS BAR AT ITS LEFT OR RIGHT END.

PROBES ARE PROVIDED FOR CHECKING CONNECTIONS TO SOCKETS. CONNECT THE PROBES TO YOUR CONTINUITY CHECKER. TOUCH THE TWO PROBES TOGETHER AND CHECK THAT THE CIRCUIT IS COMPLETED.

START AT THE BEGINNING OF THE CHAIN LIST. INSERT ONE PROBE INTO THE FIRST LOCATION SPECIFIED BY THE CHAIN LIST. FOR EXAMPLE, IF THE FIRST LOCATION WERE "A4-2", THEN YOU WOULD INSERT ONE PROBE INTO PIN 2 OF THE SOCKET LOCATED AT A4. RUN THE SECOND PROBE THROUGH EACH LOCATION ON THE CHAIN, AND BE SURE THAT CONTINUITY IS INDICATED AT EACH POINT. IF ANY POINT IS NOT CONNECTED, YOU HAVE FOUND A MISTAKE. MAKE A NOTE OF THIS MISTAKE, TURN THE BOARD OVER AND CORRECT IT. WHEN YOU THINK YOU HAVE FIXED THE ERROR, TURN THE BOARD BACK OVER AND RECHECK THE CHAIN.

WHEN THE FIRST CHAIN CHECKS OUT, GO ON TO THE SECOND. CONTINUE THE ABOVE PROCEDURE UNTIL ALL CHAINS HAVE BEEN VERIFIED.

() AB0 BUS-35 [1] A6-11 [2] B6-11 ;
 () AB1 BUS-36 [1] A4-4 [2] B4-4 ;
 () AB10 BUS-45 ;
 () AB11 BUS-46 ;
 () AB12 BUS-47 ;
 () AB13 BUS-48 ;
 () AB14 BUS-49 ;
 () AB15 BUS-50 ;
 () AB2 BUS-37 [1] A4-18 [2] B4-18 ;
 () AB3 BUS-38 [1] A4-15 [2] B4-15 ;
 () AB4 BUS-39 [1] A5-1 [2] B5-1 ;
 () AB5 BUS-40 [1] A5-4 [2] B5-4 ;
 () AB6 BUS-41 [1] A5-18 [2] B5-18 ;
 () AB7 BUS-42 [1] A5-15 [2] B5-15 ;
 () AB8 BUS-43 ;
 () AB9 BUS-44 ;
 () CLK2 BUS-59 [1] A6-14 [2] B6-14 [1] A2-1 ;
 () CP11 C4-5 [1] B6-3 [2] B6-4 ;
 () DB0 BUS-51 [1] A6-22 [2] B6-22 ;
 () DB1 BUS-52 [1] A6-21 [2] B6-21 ;
 () DB2 BUS-53 [1] A6-20 [2] B6-20 ;
 () DB3 BUS-54 [1] A6-19 [2] B6-19 ;
 () DB4 BUS-55 [1] A6-18 [2] B6-18 ;
 () DB5 BUS-56 [1] A6-17 [2] B6-17 ;
 () DB6 BUS-57 [1] A6-16 [2] B6-16 ;
 () DB7 BUS-58 [1] A6-15 [2] B6-15 ;
 () IO BUS-24 [1] A3-16 [2] B3-16 ;
 () MEM BUS-23 ;
 () V30 BUS-62 ;
 () *A008 BUS-27 ;

() *A109 BUS-28 [1] A4-6 [2] B4-6 ;
 () *A210 BUS-29 [1] A4-16 [2] B4-16 ;
 () *A311 BUS-30 [1] A4-13 [2] B4-13 ;
 () *A412 BUS-31 [1] A5-3 [2] B5-3 ;
 () *A513 BUS-32 [1] A5-6 [2] B5-6 ;
 () *A614 BUS-33 [1] A5-16 [2] B5-16 ;
 () *A715 BUS-34 [1] A5-13 [2] B5-13 ;
 () *DMA BUS-19 [1] BUS-20 ;
 () *DREQ BUS-21 ;
 () *ENA BUS-25 ;
 () *HALT BUS-22 ;
 () *IRQ0 BUS-11 [1] A4-7 [2] B4-7 ;
 () *IRQ1 BUS-12 [1] A4-9 [2] B4-9 ;
 () *IRQ2 BUS-13 [1] A4-12 [2] B4-12 ;
 () *IRQ3 BUS-14 [1] A4-10 [2] B4-10 ;
 () *IRQ4 BUS-15 [1] A5-7 [2] B5-7 ;
 () *IRQ5 BUS-16 [1] A5-9 [2] B5-9 ;
 () *IRQ6 BUS-17 [1] A5-12 [2] B5-12 ;
 () *REFR BUS-61 ;
 () *RESET BUS-18 ;
 () *RPLY A2-3 [1] BUS-60 ;
 () *SEL2 A2-4 [1] B3-12 [2] B6-9 ;
 () *SVCT BUS-7 ;
 () *VCT BUS-9 [1] BUS-10 ;
 () *WP BUS-8 ;
 () *WRITE BUS-26 [1] A6-13 [2] B6-13 ;
 () A1-8 [1] A1-11 ;
 () A1-19 [1] A1-16 [2] A1-13 [1] A1-6 [2]
 A1-3 ;
 () A2-6 [1] A2-2 [2] C2-1 ;
 () A2-19 [1] A2-18 ;

() A3-1 [1] A4-5 ;
() A3-2 [1] A4-17 ;
() A3-3 [1] A4-14 ;
() A3-4 [1] A5-2 ;
() A3-5 [1] A5-5 ;
() A3-6 [1] A5-17 ;
() A3-15 [1] A5-14 ;
() A3-19 [1] A3-18 ;
() A6-2 [1] D3-12 ;
() A6-5 [1] D1-13 [2] D1-14 ;
() A6-6 [1] D1-16 [2] D1-17 ;
() A6-7 [1] A5-11 [2] A5-8 [1] A4-11 [2]
A4-8 ;
() A6-9 [1] A3-12 [2] A2-5 ;
() A6-25 [1] A6-8 [2] A6-10 [1] A6-12 ;
() B1-8 [1] B1-11 ;
() B1-19 [1] B1-16 [2] B1-13 [1] B1-6 [2]
B1-3 ;
() B2-1 [1] A1-14 ;
() B2-2 [1] B1-14 ;
() B2-4 [1] A1-17 ;
() B2-5 [1] B1-17 ;
() B2-13 [1] A1-5 ;
() B2-14 [1] B1-5 ;
() B2-16 [1] A1-2 ;
() B2-17 [1] B1-2 ;
() B2-19 [1] B2-18 ;
() B3-1 [1] B4-5 ;
() B3-2 [1] B4-17 ;
() B3-3 [1] B4-14 ;
() B3-4 [1] B5-2 ;

() B3-5 [1] B5-5 ;
 () B3-6 [1] B5-17 ;
 () B3-15 [1] B5-14 ;
 () B3-19 [1] B3-18 ;
 () B6-2 [1] D4-12 ;
 () B6-5 [1] D2-13 [2] D2-14 ;
 () B6-6 [1] D2-16 [2] D2-17 ;
 () B6-7 [1] B5-11 [2] B5-8 [1] B4-11 [2]
 B4-8 ;
 () B6-25 [1] B6-8 [2] B6-10 [1] B6-12 ;
 () C2-8 [1] C2-3 ;
 () C2-19 [1] C2-18 ;
 () C3-4 [1] C3-12 [2] A1-18 [1] A1-15 [2]
 A1-4 [1] A1-1 ;
 () C3-5 [1] C3-3 [2] C3-17 ;
 () C3-19 [1] C3-18 ;
 () C4-3 [1] C3-15 ;
 () C4-13 [1] A6-3 [2] A6-4 ;
 () C4-15 [1] C3-6 ;
 () C4-19 [1] C4-18 [2] C4-17 [1] C4-14 [2]
 C4-4 [1] C4-1 ;
 () C5-8 [1] C5-7 [2] C5-6 [1] C5-3 [2]
 C5-2 [1] C5-1 ;
 () C6-1 [1] C3-16 [2] C3-14 [1] C3-13 [2]
 B1-18 [1] B1-15 [2] B1-4 [1] B1-1 ;
 () C6-6 [1] C2-12 [2] C2-5 [1] C2-2 [2]
 C2-16 ;
 () C6-7 [1] C2-11 [2] C2-14 [1] C2-17 [2]
 C2-7 ;
 () C6-8 [1] C6-5 ;
 () C6-11 [1] C3-2 [2] C3-1 ;
 () C6-12 [1] C4-16 [2] C4-2 ;
 () C6-13 [1] B2-3 ;
 () C6-14 [1] B2-6 ;

() C6-15 [1] B2-12 ;
() C6-16 [1] B2-15 ;
() C6-19 [1] C6-18 ;
() D1-3 [1] CON1-9 ;
() D1-6 [1] CON1-6 ;
() D1-7 [1] D1-5 [2] D1-4 [1] D1-2 ;
() D1-12 [1] CON1-5 ;
() D1-15 [1] CON1-3 ;
() D1-20 [1] D1-18 ;
() D1-22 [1] D1-1 ;
() D2-3 [1] CON2 -9 ;
() D2-6 [1] CON2 -6 ;
() D2-7 [1] D2-5 [2] D2-4 [1] D2-2 ;
() D2-12 [1] CON2 -5 ;
() D2-15 [1] CON2 -3 ;
() D2-20 [1] D2-18 ;
() D2-22 [1] D2-1 ;
() D3-1 [1] CON1-8 ;
() D3-2 [1] C5-13 ;
() D3-3 [1] A6-23 [2] A1-7 ;
() D3-4 [1] CON1-4 ;
() D3-5 [1] C5-12 ;
() D3-6 [1] A6-24 [2] A1-12 ;
() D3-13 [1] C5-11 ;
() D3-14 [1] CON1-2 ;
() D3-19 [1] D3-18 ;
() D4-1 [1] CON2 -8 ;
() D4-2 [1] C5-18 ;
() D4-3 [1] B6-23 [2] B1-7 ;
() D4-4 [1] CON2 -4 ;

() D4-5 [1] C5-17 ;

() D4-6 [1] B6-24 [2] B1-12 ;

() D4-13 [1] C5-16 ;

() D4-14 [1] CON2 -2 ;

() D4-19 [1] D4-18 ;

() GND D1-7, D2-7, D3-7, D4-7, C2-8, C3-7,
C4-7, C5-8, C6-8, B2-7, B3-7, B6-1,
A2,7, A3-7, A6-1, CON1-7, CON2-7

() VCC (+5V) A2-18, A3-18, A6-12, B2-18,
B3-18, B6-12, C2-18, C3-18, C4-18,
C6,18, D3-18, D4-18

() V12 (+12V) D1-18, D2-18

() *V12 (-12V) D1-1, D2-1

BEFORE PROCEEDING ANY FARTHER:

- () REMOVE ALL CARDS FROM THE CARD CAGE.
- () PLUG THE CARD INTO THE EXTENDER CARD.
- () PLUG THE EXTENDER CARD INTO THE CARD CAGE, INCLUDING POWER SUPPLY.
- () PLUG IN THE POWER.

TEST THE FOLLOWING VOLTAGES WITH A VOLTAGE METER:

- () () () () +5V ON +5V BUSS BAR.
- () +12V ON +12V BUSS BAR.
- () -12V ON -12V BUSS BAR.

IF THESE VOLTAGES ARE NOT CORRECT, CHECK FOR SOLDER BRIDGES OR COLD SOLDER JOINTS ON THE SOLDERED COMPONENTS ON THE EDGE OF THE CARD. IF THERE ARE ANY SOLDER BRIDGES, FIX THEM AND RETEST THE VOLTAGES.

SECTION 6 COMPONENT INSTALLATION

6.1 INSTALLING 8-, 14-, 16-, AND 18-PIN IC'S

A STATIC ELECTRICITY DISCHARGE CAN DAMAGE THESE CIRCUITS. IT IS VERY IMPORTANT THAT CARE BE TAKEN TO AVOID BUILDUP OF STATIC ELECTRICITY WHEN HANDLING THESE COMPONENTS:

WORK ONLY ON AN UNCARPETED FLOOR. BEFORE HANDLING THESE COMPONENTS, TOUCH A WATER FAUCET OR OTHER GROUND POINT TO DISCHARGE STATIC ELECTRICITY.

HOLD THE IC BY THE EDGES, NOT TOUCHING THE PINS, AND USING THE WORK SURFACE, BEND THE PINS ON EACH SIDE OF THE IC TO A 90-DEGREE ANGLE.

ORIENT THE CIRCUIT CARD SO THAT THE SOCKETS ARE FACING UP WITH THE DIMPLE IN THE LEFT CORNER AND THE BUS CONNECTOR TOWARD YOU.

USING A SLOW, FIRM, DOWNWARD PRESSURE, WORK THE IC INTO THE SOCKET.

IF A LEAD STARTS TO BEND, PULL OUT THE IC, STRAIGHTEN THE LEADS WITH A PAIR OF NEEDLENOSED PLIERS, AND START THE PROCEDURE AGAIN.

INSTALL THE SPECIFIED 14-PIN IC'S TOWARD THE TOP OF THE SOCKET. THE BOTTOM 4 PINS ARE LEFT EMPTY.

()	LOCATION A2, PART 74LS26	()	LOCATION A3, PART 74LS30
()	LOCATION B2, PART 74LS00	()	LOCATION B3, PART 74LS30
()	LOCATION C3, PART 74LS00	()	LOCATION C4, PART 74LS74
()	LOCATION D1, PART MC1488	()	LOCATION D2, PART MC1488
()	LOCATION D3, PART MC1489	()	LOCATION D4, PART MC1489

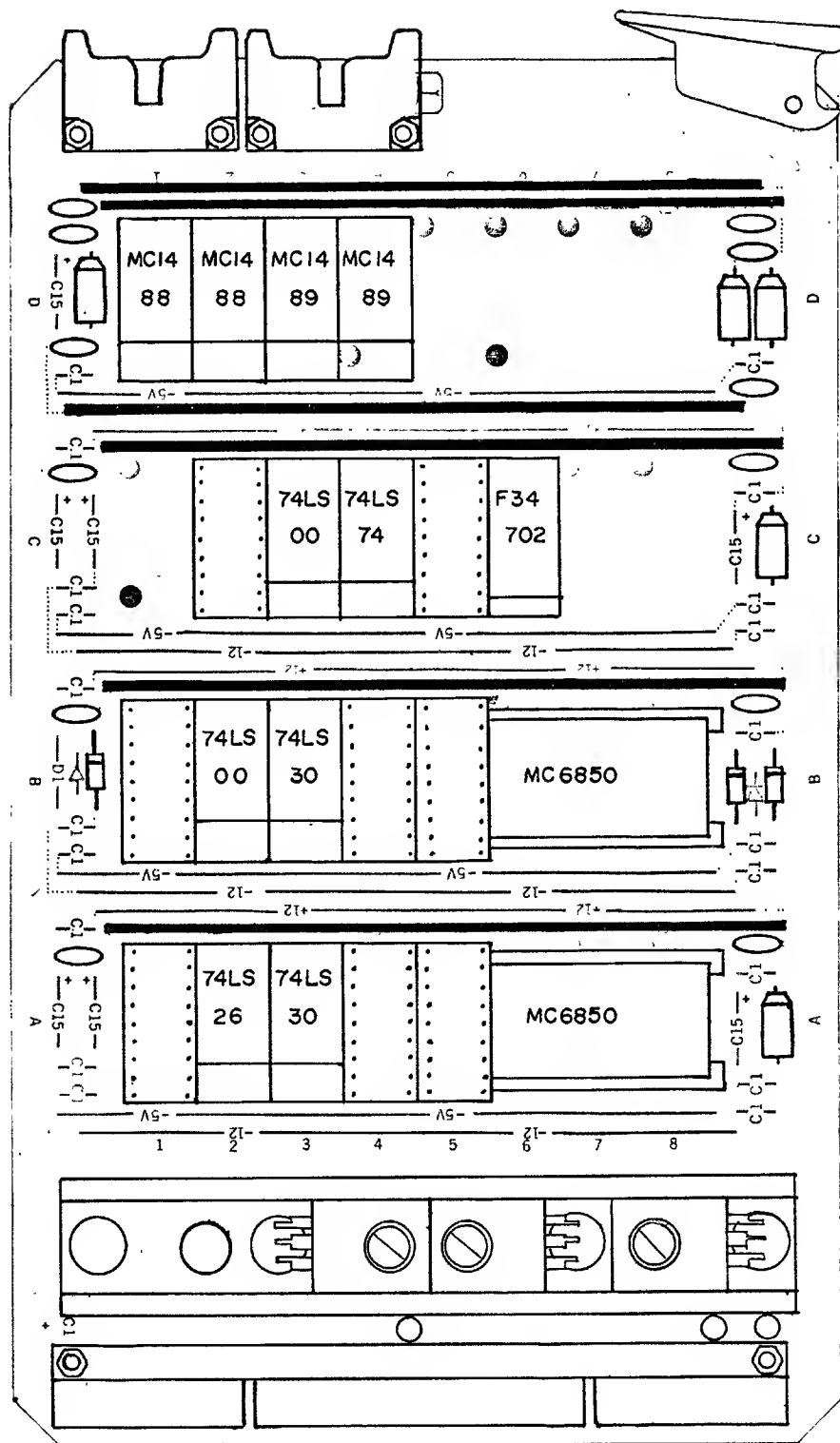
INSTALL THE SPECIFIED 16-PIN IC'S TOWARD THE TOP OF THE SOCKET. THE BOTTOM 2 PINS ARE LEFT EMPTY.

() LOCATION C6, PART F34702

6.2 INSTALLING 24- AND 40-PIN IC'S

INSTALL THE SPECIFIED 24-PIN IC'S IN THE FOLLOWING SOCKETS. ORIENT THE DOT ON THE IC TOWARD THE LOWER LEFT HAND CORNER.

() LOCATION A6,7,8 PART MC6850
() LOCATION B6,7,8 PART MC6850
() CONFIRM DOT IN LOWER LEFT HAND CORNER.



6.3 INSTALLING DISCRETE COMPONENTS

LOCATION C2

INSTALL 1K OHM RESISTOR (BROWN, BLACK, RED) IN HOLES
CORRESPONDING TO THESE PINS OF THE SOCKET:

() 1 AND 18

INSTALL 1M OHM RESISTOR (BROWN, BLACK, GREEN) IN HOLES
CORRESPONDING TO THESE PINS OF THE SOCKET:

() 5 AND 14

INSTALL 47PF CAPACITOR ("470") IN HOLES CORRESPONDING TO
THESE PINS OF THE SOCKET:

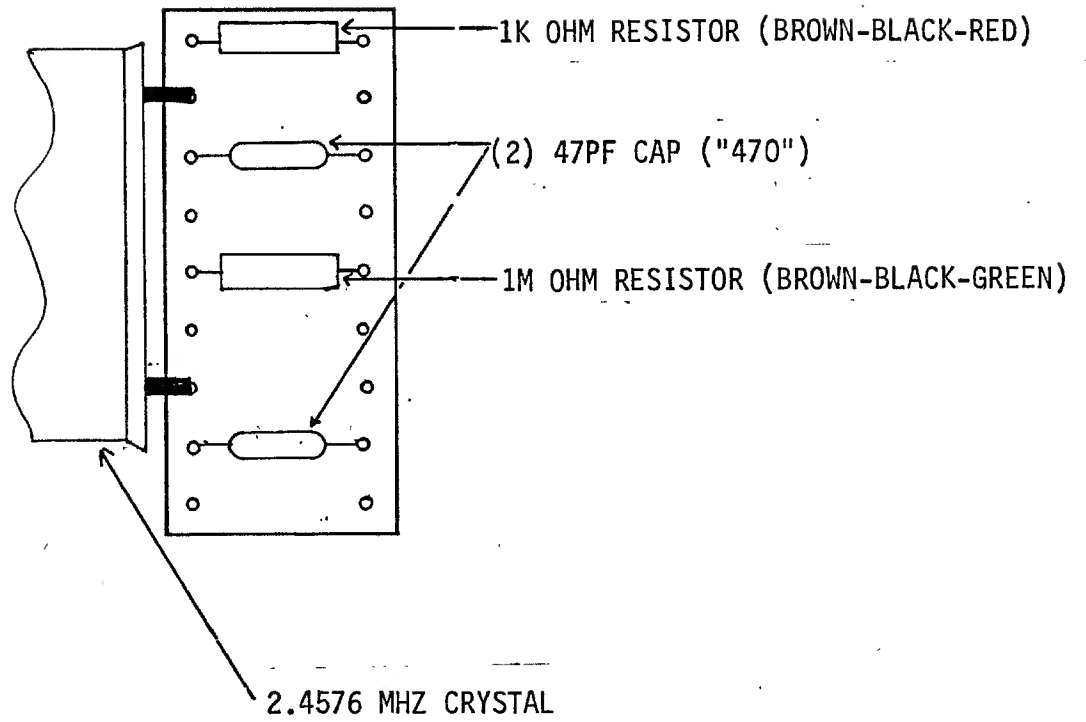
() 3 AND 16

() 8 AND 11

INSTALL 2.4576 MHZ CRYSTAL IN HOLES CORRESPONDING TO THESE
PINS OF THE SOCKET:

() 2 AND 7

LOCATION C2



2/17/78

ADDENDUM SHEET: UPGRADE SERIAL PORTS TO HANDLE 19.2K BAUD

To make your serial port(s) capable of handling 19.2K baud terminals,
add the following wire (on IC 4702- baud rate generator):

SDI-125 B3-3 (1) B3-17 Black Wire

DSD-125 C6-3 (1) C6-17 " "

RRS-027 B2-3 (1) B2-17 " "

SPI-017 C3-3 (1) C3-17 " "

HYT-087 (QUM-087) C3-3 (1) C3-17 Black Wire

BAUD RATES (Location A1 &/or B1)

